CLAIMS

WE CLAIM:

1. An energy storage flywheel system, comprising:

a housing assembly;

a shaft disposed within the housing assembly;

a flywheel assembly mounted on the shaft;

one or more primary bearing assemblies disposed within the housing assembly, each primary bearing assembly configured to selectively rotationally support the shaft;

one or more auxiliary bearing assemblies disposed within the housing assembly, each auxiliary bearing assembly configured to selectively rotationally support the shaft and including:

a bearing having at least an inner race and an outer race,

a bearing mount coupled to the bearing inner race, the bearing mount disposed adjacent to, and configured to selectively engage and disengage, the shaft,

a sleeve having at least an inner surface, an outer surface, a first end, and a second end, at least a portion of the sleeve inner surface coupled to the bearing assembly outer race and at least a portion of the sleeve outer surface coupled to the housing assembly,

one or more resilient seals coupled between the sleeve outer surface and the housing assembly, and

one or more preload springs coupled between the housing assembly and one of the first and second sleeve ends.

2. The system of Claim 1, wherein each auxiliary bearing assembly comprises a rolling element bearing assembly having a plurality of spherical balls disposed between the inner and outer races.

3. The system of Claim 1, wherein each bearing assembly mount comprises:

a touchdown cup having at least an outer surface and an inner surface that defines a cavity, the touchdown cup outer surface coupled to the bearing assembly inner race, the touchdown cup cavity surrounding at least a portion of the shaft and dimensioned, upon relative translational movement between the bearing assembly mount and the shaft, to selectively engage the shaft.

4. The system of Claim 1, wherein:

the sleeve comprises one or more grooves formed in the outer surface thereof; and

each resilient seal is disposed in at least one of the grooves.

5. The system of Claim 1, wherein each resilient seal comprises an o-ring seal.

6. The system of Claim 1, wherein each preload spring comprises one or more spring washers.

7. A bearing assembly for selectively engaging a shaft, comprising:

a bearing having at least an inner race and an outer race;

a bearing mount coupled to the bearing inner race;

a sleeve having at least an inner surface, an outer surface, a first end, and a second end, at least a portion of the sleeve inner surface coupled to the bearing outer race;

one or more resilient seals coupled to the sleeve outer surface; and

one or more preload springs coupled to one of the first and second sleeve ends.

8. The bearing assembly of Claim 7, wherein each auxiliary bearing assembly comprises a rolling element bearing assembly having a plurality of spherical balls disposed between the inner and outer races.

9. The bearing assembly of Claim 7, wherein the bearing assembly mount comprises:

a touchdown cup having at least an outer surface and an inner surface that defines a cavity, the touchdown cup outer surface coupled to the bearing assembly inner race, the touchdown cup cavity surrounding at least a portion of the shaft and dimensioned, upon translational movement of the bearing assembly mount, to selectively engage the shaft.

10. The bearing assembly of Claim 7, wherein:

the sleeve comprises one or more grooves formed in the outer surface thereof; and

each resilient seal is disposed in at least one of the grooves.

11. The bearing assembly of Claim 7, wherein each resilient seal comprises an o-ring seal.

12. The bearing assembly of Claim 7, wherein each preload spring comprises one or more spring washers.